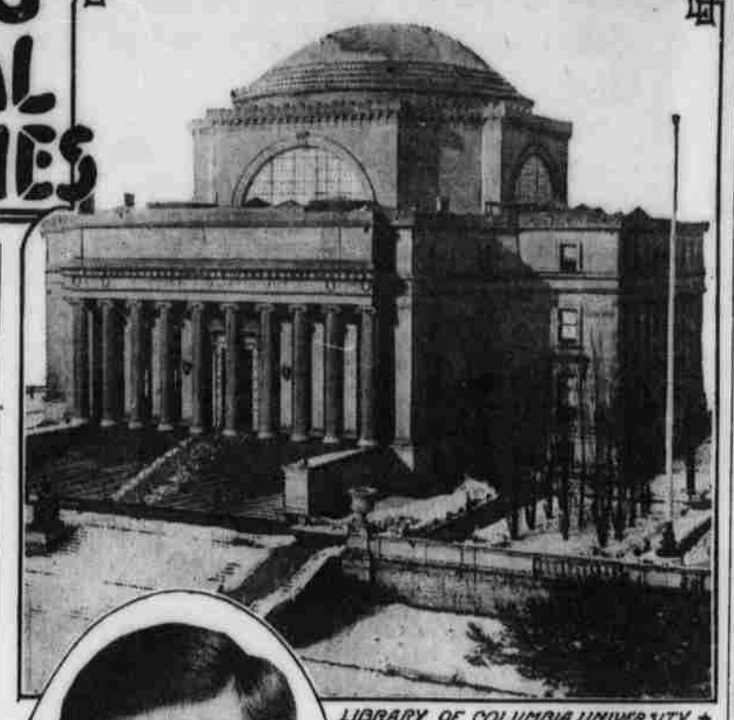
AMAZING CHEMICAL DISCOVERIES



LIBRARY OF COLUMBIA UNIVERSITY

DR. WALTER F. RITTMAN

SECRETARY Lane of the interior department recently announced that Dr. Walter F. Rittman, chemical engineer of the bureau of mines, had made two chemical discoveries of epoch-making importance. One, it was announced, will greatly increase the production of gasoline; the announcement stated that the other will make the United States independent of the rest of the world in the production of materials necessary for the dye industry and the manufacture of high explosives. These discoveries have the double importance of being of the highest interest scientifically and probably of the highest value commercially.

The old method of refining petroleum was to heat up the material in a still and condense the vapors coming off. Gasoline is all of the vapor which passes off up to 150 degrees centigrade. This was a simple distillation process. The experimental work of Doctor Rittman has been done at various ranges of pressure from up to nearly 500 pounds per square inch down to partial vacuum and at ranges of temperature from 1,000 degrees centigrade down to the lowest temperature at which the apparatus could be worked.

In his laboratory at Havemeyer hall at Columbia university he has an experimental apparatus which occupies one end of a small room and in which he can make experiments upon any oil under any conditions he chooses. The results are carefully tabulated and the products produced are analyzed. Before carrying out these actual experiments, however, the problem was attacked from the purely theoretical side.

Working from a theoretical standpoint, the expected results were mapped out and then the experiments were tried under the chosen conditions in order to either verify or disprove the prognostications. Using this general method of procedure, the research was carried on and the discovery made of the conditions necessary to produce larger yields of gasoline from petroleum. Later were found the conditions necessary for the production of toluol and benzol from petroleum.

The consumption of gasoline by automobiles, motor cycles, aeroplanes, motor boats, and the various types of internal combustion engines used for power has increased enormously in the last few years. The increase in the number of motor vehicles shows this, for, according to the best estimates, there were, in 1910, 350,000 such vehicles; in 1912 there were 990,000, while at the present time the number has reached 1,500,000. Upon the assumption that each motor vehicle uses ten barrels of gasoline per year, the demand from this source alone would be 15,000,000 barrels of 42 gallons each. The gasoline exported and that used for other purposes makes our annual consumption reach a total of about 25,000,000 gallons, which is the present production.

The supply has not been increasing as fast as the demand, however, and even now it would be inadequate were it not for the fact that in the last three years many new processes have been patented for increasing most of the production. These have had no commercial value, however, except one, the Burton process, which is controlled by the Standard Oil company.

The situation which developed when this process was brought out three years ago was an interesting one. The supply of gasoline was so nearly exceeded by the demand that the situation was very critical and the price was high. There was a real "gasoline problem." It seemed impossible to meet the increasing demand with an adequate supply.

Benzol was also put forward as a substitute. It was found possible to use this material for motor vehicles in Europe to a certain extent by employing special carburetors, although it was not entirely satisfactory.

After all, nothing was really able to take the place of gasoline in being entirely satisfactory, nor was there an adequate supply of any other material. It was at this time that the Standard Oil company solved the "gasoline problem" by utilizing the Burton process, which gave prospect of an abundance of gasoline for some years at least.

However, the independent refiners, who were prevented by the patents from using this superior method of distilling their crude oil, could not materially increase their output of gasoline, and it is in this connection that Doctor Rittman's discovery will be of such great benefit. Not only will it be available to the Standard Oil company, but it will be at the disposal of any reputable company in the United States.

The patents, when they are issued, will be given absolutely to the people of the United States, and measures will be taken to insure that the new process will never be allowed to anyone to use as a monopoly.

The discovery as to gasoline is perhaps exceeded in importance, however, by the discovery of the fact that such products as toluol and benzol, heretofore obtained from coal tar alone, can now be made from petroleum.

In normal times there is produced an enormous quantity of benzol and toluol in Germany, where, as in all Europe, the coke is made in by-product ovens, and the tar and its associated products saved. In the United States only about 25 per cent of the coke is made in such a way as to save the by-products.

Benzol and toluol are raw materials in the manufacture of many medicines, dyestuffs and explosives. The fact that the United States is apparently to have a plentiful source of raw material for the making of these will probably be a stimulus to the building up here of new industries. Up to the time of the present war Americans produced only a small fraction of the dyestuffs actually used in American industries. The fact that since the outbreak of the war the United States has been unable to obtain an adequate supply of dyes has had already an effect in causing effort to be made for launching an industry for the production of dyestuffs.

The Rittman discoveries are also of the utmost importance as to explosives. In case of a war in which the United States would be shut off from an outside supply of benzol and toluol, it would be able to produce for the use of the army and navy from its large supplies of petroleum practically any amount of these materials desired.

Many of our modern drugs and medicines are made directly or indirectly from benzol. The production of this latter material at a cheap price would be a great stimulus to the building up of a large synthetic drug industry in this country. At the present time Germany has a monopoly in this business.

The man who has made these notable discoveries was born in Sandusky, Ohio, December 2, 1883.

In 1908 he received a bachelor of arts degree from Swarthmore college, in Pennsylvania, and in 1909 he received his master of arts degree from the same place. During 1909 he served as chemist for the United Gas Improvement company of Philadelphia. He served as lecturer and laboratory instructor in Swarthmore from 1909 to 1912, and continued his studies in engineering, so that he was granted a degree of mechanical engineer in 1911. While at Swarthmore, and especially during the last three years, he was engaged in professional chemical engineering work, both in chemical and mechanical lines.

In the fall of 1912 he came to Columbia university to do the work which got for him, in June, 1914, the degree of doctor of philosophy. The research work for this degree was carried out in the industrial laboratories of Havemeyer hall, Columbia, under the direction of Prof. M. C. Whitaker. The results of these investigations were published in the May and June, 1914, numbers of the Journal of Industrial and Engineering Chemistry, and were upon the subject "Thermo-Reactions in Carbureting Water Gas." In this research work was laid the foundation for the work which led to his discoveries. This piece of research was so much praised that he was asked to take a position with the United States bureau of mines at Pittsburgh as chemical engineer. After accepting this position he continued to study the problem of obtaining larger yields of gasoline in the distillation of crude oil.

He found that at the laboratories in Pittsburgh there was not the kind of apparatus that was required for the work which he had in mind. The work which he had done in studying the thermal reactions in the carbureting of water gas required a special piece of apparatus, and this had been designed and built in the laboratories in Havemeyer hall, so that it was desirable that in the continuance of his researches he be able to use this apparatus. Through the courtesy of the university authorities he was able to take up his investigation for the bureau of mines in one of the private laboratories of the department of chemistry, where he could make use of the apparatus which he had formerly used as a graduate student.

While his experimental distillation apparatus is not large enough to be called factory size, it is much larger than the ordinary laboratory size, and he was enabled to get results which gave indications that the process was feasible on a commercial scale.

Doctor Rittman is modest in his claims and desires to have time to perfect his processes in larger size units before making any statements as to the cost of the production.

The apparatus which has been used in all of the experimental work is practically the same as that used in the research which won for him his Ph. D. from Columbia university last June. The oil, which may be a crude oil, and which by the ordinary process of distillation might yield no gasoline at all, is introduced into the apparatus by a feeding device which controls the rate at which it is led into the furnace. Besides crude oil it is possible to use residues which remain from former distillations by the old process, and even the oils from the California oil fields, which yield practically no gasoline. As the oil enters the top of the furnace it comes in contact with a mass of hot steel balls which vaporizes the oil. The furnace itself, into which the oil vapor next passes, is simply a piece of iron pipe heated by an electric current which passes through a coil of resistance wire surrounding the pipe but separated from it by asbestos.

What actually takes place in the distillation process is no doubt a breaking down of the larger and more complex molecules of the oil used, into the gasoline molecule or the benzol molecule as the case may be. This process is technically known as "cracking" the oil.

The foreign patents which Doctor Rittman is taking out will, of course, be his own personal property. The entire rights of the American patents will be vested in the public, however, and he will receive no compensation except his salary.

AND AFTER THAT, THE ALTAR

Really There Was Nothing Else to It When He Had Been Led to Make the Plunge.

Of course, when she stopped in front of the jeweler's window he had to stop, too. It would hardly have been polite to walk on and leave her there.

"Oh, see the tray full of lovely diamond rings!" she crowed.

"Yes," he admitted.

"They're engagement rings!"

"Shouldn't be surprised," he replied. "But come on; we've seen them now, you know."

"They're the gorgeousest engagement rings," she sighed. "The diamonds look diamond-colored now, but when you put them on your finger they turn a bright pink."

"Peruke, I hardly believe that," he rebuked.

"They do! They do! Come and I'll show you," and she dragged him into the shop and had the jeweler bring the rings in out of the window. "Now slip one on my finger and we'll see," she pouted, and held out the dangerous finger of her left hand, and with considerable curiosity he slipped a ring on it.

"Jack!" she exclaimed. "This is so sudden!"

"Ethel!" he cried.

And, oblivious of the jeweler, of all else save love's young dream, they crashed into each other's arms.

As a matter of fact the chorus girl is merely a matter of form.

NEWS and GOSSIP of WASHINGTON

President Wilson, Believing in Slang, Said "Rats"

WASHINGTON.—Though the diction of President Wilson is elegance itself, he is not so bide-bound in his exactions of the refinements of it as to be intolerant to the lapses in style called slang. He frequently uses it with great force and has apparently been long a student of it, and at a time, too, when the classic shades of his university surroundings should have made the sound of it unusual to his ears.

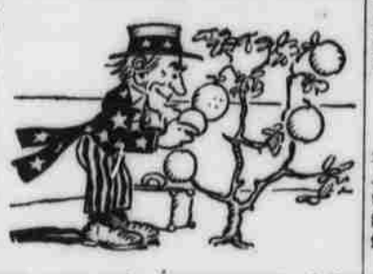
Not long ago the president was called upon to comment on the report current and printed that some person authorized by him was circulating a document in Wall street signed by his name urging big business to get together to help business. "Was the president really back of the document?" he was asked. "Oh, rats," was his sententious reply.

Now, in cold type it looks as if the president was not observing the presidential proprieties in dignity. But the president conducts himself ever in such a manner that his dignity is never in question. There is a wonderful graciousness of manner in him and an ever prevailing smile on his face and a merry twinkle in his eyes, so as to pass as natural and consonant with the utmost requirements of the dignity of his station whatever he utters, though couched in language which on other lips would be called vulgar.

These sallies and departures of the president are sure to be followed by a hearty laugh, which it was intended they should occasion. In short, the president will laugh a question or a proposal out of court. A good story, of which the president has a great store, or a sharp word in slang is the instrumentality used.

Uncle Sam Searches the World for New Fruits

FROM the office of information of the department of agriculture comes the delectable announcement that a smoothstone peach has been brought from China and is to be used to improve our commercial fruit of the same family. We are told also that a beautiful Chinese quince, "golden on one side and reddish on the other," is doing well in its new American environment, a condition of thriving and promise, which is also true of Chinese hazelnut bushes brought to America, and which now are bearing nuts that ought to make our inferior-sized fruit crack for the very shame of insignificance.



There is no joke about these importations. The bureau of plant industry of the United States government never make announcement of the addition of new fruits, plants and flowers to the American field until their successful growth has been proved.

The government employs explorers to go into lands new and old for the purpose of finding valuable trees and plants which can be added to the native growths of the United States. The explorer must know his own country well, for in his work of discovery he must bear in mind just what section of the homeland it is which resembles the region in which his work is being done.

These explorers are a hardy lot, and their work is at times dangerous. They delight in it, apparently, and always are ready to undertake journeyings into new fields, no matter how forbidden. Comparatively little is known of Uncle Sam's bureau of plant industry. Its work, however, is apparent all over the United States.

Treasures in Crypt and Vaults Under the Capitol

THERE are all kinds of treasures in the crypt and vaults under the capitol rotunda, but during the last few years many of them have been taken out in order to make space. Immediately under the central dome is the large crypt and vault, a subterranean museum of historical works of art. The first object of historical interest is the tomb built for Washington, immediately under the centerstone of the floor of the rotunda, which is the exact center of the building. It is a small, square, vaultlike room, with about two-thirds of its side walls deeply recessed in arched alcoves, or rather more like the recessed reliquary chambers in the tomb of Napoleon. This vault was built up in the masonry of the base walls of the building and designed as a tomb for the immortal Washington, but other influences of a more sentimental nature defeated the object.

In an adjoining vaulted room the plaster cast of Cranford's "Goddess of Liberty," from which Clarke Mills cast the bronze figure that surmounts the dome of the capitol, was kept for years. In another room are the plaster statues of Alexander Hamilton, Thomas H. Benton and also a sitting figure of Hamilton by the artist Stone.

In various portions of the crypt are paintings of large size in boxes waiting for their owners to claim them. Among them are the "First Nebraska Homestead," by a lady who desired to present it to the government; "Rescue of Greely," by Operti, and "Farthest North," the subject of which is two of Greely's men taking observations.

Washington Has a Thousand-Dollar-a-Week Hole

NO one does justice to a visit to Washington who does not take a long look at the huge crater which is the hole where once stood the famous Arlington hotel. This was torn down four years ago to make room for a modern hotel, to be up by the 1913 inauguration, but the hotel has gone no further than down about forty feet into the ground. An immense fortune has been lost in the speculation so far. While construction was begun, the plans fell through, because the capital required was not raised in toto. Everything went under the creditors' hammer a year ago, and what had cost about $1,600,000 was sold for half that sum. Another hotel project was started to include a theater and office building, but it is understood that everything is off again and the loss of more fortunes seems in sight. Charles P. Taft, brother of former President Taft, having lost about $200,000. The hole is so deep that nothing can be done with it except to provide a foundation for a great structure, and as matters now stand the owners of the hole pay $1,000 a week in interest and taxes. It is the costliest hole in Washington, and has become one of the sights of the city.

Of this land formerly used to stand the home of Senator Charles Sumner of Massachusetts. Hard by is Lafayette square and near is the White House. Two prominent clubs look right into the hole from their windows. Shored up are the grounds and the walls of a large private house, which used formerly to be the British embassy, in which Bulwer-Lytton wrote "Lucile."

Home, Sweet Home.

Wife—What, going out again tonight?

Husband—Yes, dear. Going out occasionally, you know, heightens the pleasure of staying home when one gets the chance to.

Wife—But you go out so often.

Husband—Well, it's a pleasure that really requires a great deal of heightening.

Tells What's the Matter With Him.

"Well, what is the complaint?" demanded Squire Peacy, the well-known Arkansas justice of the peace, as there entered his office Constable Slackputter escorting a colored malefactor.

"De complaint, yo' honah — and t'anky for de 'terrygation—" replied the culprit, before the officer could make answer, "am a posthumous creech in muh back, dat kotches me ker-blick every time I tries to run. Yassah, if it hadn't uh been dat-uh-way, de cap'n, yuh, wouldn't uh overtook me in a munt o' Sundays!"—Kansas City Star.

Quite Correct.

"What reason have you for asserting that Love isn't blind?"

"Well, I've noticed that his blandest smiles are all for the prettiest girls."

After the Meeting.

Orator's Wife—Did the people applaud?

Orator (with bitterness)—Applaud? They made less noise than a rubber heel in a feather bed!

Same Thing.

"Oh, dear! I must do something to reduce my weight. I weigh a hundred and sixty."

"Stripped?"

"Well, in my dancing frock."

Only a nonsalaried office is compelled to seek the man.